Fuzing for Global Interoperability

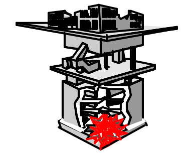
- **Cockpit Programming to Reduce Logistics**
- **Distributed Arming Systems for Missiles**
- **Tolerant Burst Point Control**

Report Documentation Page

Report Date 16Apr2001	**Report Type** N/A	**Dates Covered (from... to)** -

Title and Subtitle Fuzing for Global Interoperability	**Contract Number**
	Grant Number
	Program Element Number
Author(s)	**Project Number**
	Task Number
	Work Unit Number
Performing Organization Name(s) and Address(es) Unknown	**Performing Organization Report Number**
Sponsoring/Monitoring Agency Name(s) and Address(es) NDIA (National Defense Industrial Assocation) 211 Wilson BLvd., Ste. 400 Arlington, VA 22201-3061	**Sponsor/Monitor's Acronym(s)**
	Sponsor/Monitor's Report Number(s)
Distribution/Availability Statement Approved for public release, distribution unlimited	
Supplementary Notes Proceedings from The 45th Annual Fuze Conference, 16-18 April 2001 Sponsored by NDIA, The original document contains color images.	
Abstract	
Subject Terms	
Report Classification unclassified	**Classification of this page** unclassified
Classification of Abstract unclassified	**Limitation of Abstract** UU
Number of Pages 11	

Future Cockpit Programming



Present programming

- Mission planning tools program a PCMCIA card
- PCMCIA card sent to fuze programming site or Mission data sent to fuze programming site and program a PCMCIA card
- Setter unit programs fuze on ground
- Fuze's program checksums hand written on weapon
- Weapon loaded onto specific location of aircraft
- In-flight, fuze mission data can be reprogrammed
- Pilot selects proper weapon from aircraft stores
- Launch weapon

Future programming

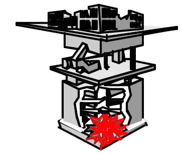
- Mission planning develops mission data
- Mission data sent to aircraft
- Aircraft programs fuze, including weapon type
- Launch weapon

ATK ALLIANT TECHSYSTEMS

Cockpit Programming Improvements

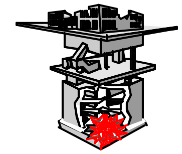
- Reduce Tactical Response Time by eliminating Ground Programming Processes
- Increase Reliability of Launching Proper Weapon from Aircraft. Prevent Launching Weapon with Wrong Mission Data at a Target, when can't Interrogate Weapon on Aircraft
- Eliminate Hardware, I.e. Ground Setter Unit
- Eliminate Training, I.e. Ground Setter Unit Training
- Eliminate Maintenance I.e. Ground Setter Unit Maintenance
- Increase Fuze Connector Life and Reliability
    - Reduce Number of Connections to Fuze

Cockpit Programming Plan



- **Develop System Safety Approach to program Mission and Weapon Type Parameters**
- **Obtain Safety Board Approval of Approach**
- **Implement Approach**
- **Obtain Safety Board Approval of Design**

Distributed Arming Systems



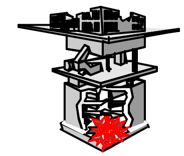
- Reason for a Distributed Arming System
  - Fuze does not have access to Arming Environments, like when Fuze is buried in a Missile

- Core Requirements for Distributed Arming System
  - MIL-STD-1316 requires Two Independent Arming Environments that Independently Control Arming
    - Hardware only (No Software) in at Least One Arming Environment Path
  - Unique Code for Arming

Examples of Distributed Arming Systems

- Free-Flight and Guided Bomb Systems
  - FMU-139 and FZU-48
  - FMU-152 and FZU-55
  - HTSF and FZU-60
- BAT: Umbilical Separation, Air Stream Sensing, and ESAD
- TTPV with a HTSF
- CALCM with a HTSF
- Others

FZU Distributed Arming Systems



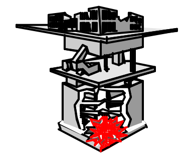
- FZU detects Two Independent Arming Environments
  - Lanyard Pull
    - Minimum Lanyard Pull Force
    - FZU Time Windows the Turbine Release Arming Environment
  - FZU Powers Fuze with Post Launch Air Stream
- Unique Power & Turbine Release Signals from FZU-48 & FZU-55
  - Positive for Power
  - Negative for Turbine Release
- FZU-60 Power and Turbine Release Frequencies verified with HTSF & MEHTF

Missile Distributed Arming Systems

- Missile programs Fuze
- Missile detects Arming Environments
- Missile builds Unique Arm Code with Arming Environment Data
- Missile provides Arming Power to Fuze
- Missile provides Unique Arm Code to Fuze
- Fuze arms after
  - Timing out Arm Time
  - Detecting Unique Arm Code

ATK ALLIANT TECHSYSTEMS

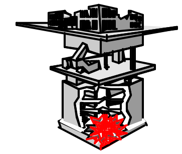
Unique Arm Code



- **Probability of Occurrence << One in a Million to meet MIL-STD-1316's Less than One in a Million arm before launch for System**
- **Ignores Common signals**
  - **Common power: DC, 110Vac. 60hz; 110Vac, 400hz**
  - **Low Frequency Guidance Signals**
- **Provides Immunity to Electromagnetic Environments**

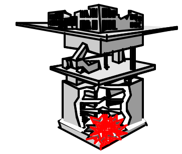
  (HERO, EMV, Other)
- **Built using arming environments like**
  - **Launch**
  - **Deployment of Air Surfaces**
  - **Post Launch Air Stream or Engine Power**
  - **Other**

Tolerant Burst Point Control

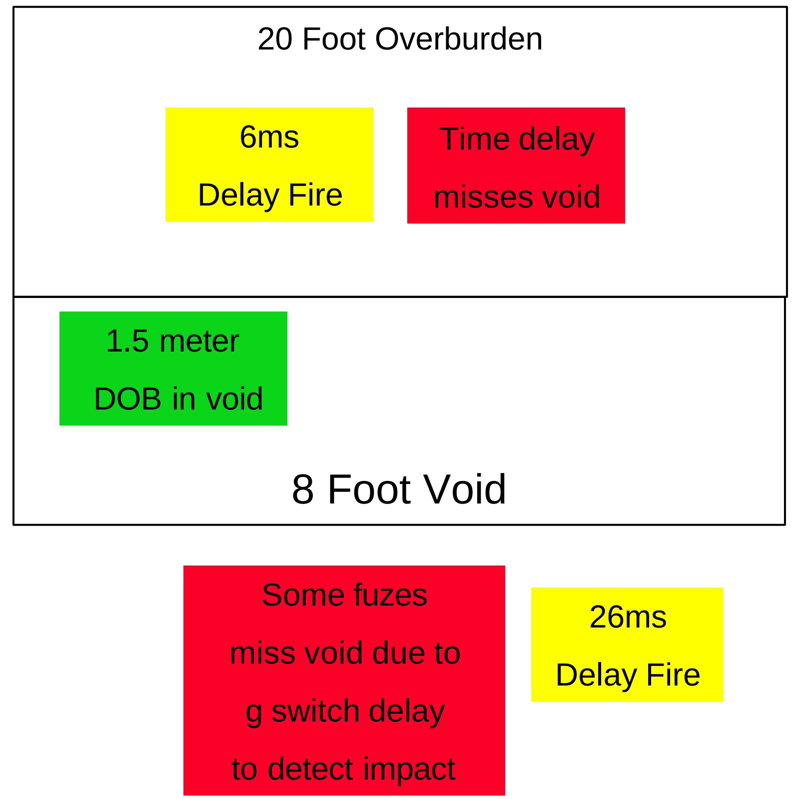


- **Void Detection of HTSF and MEHTF provide Accurate Depth of Burial for**
  - **Varying Overburden**
  - **Multiple Voids**
  - **Unknown Void Lengths**

HTSF & MEHTF Void Burst Point Control



- **Void depth of burial makes target defeat economical with Tolerant burst point control**
- **DOB from void entry fires warhead in void without accurate target intelligence**
  - **Prevents fires before and after voids**
  - **Reduces DOB errors from variations in overburden, impact angles, angle of attack, impact velocity, and warhead turning during penetration**



ATK ALLIANT TECHSYSTEMS